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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | | | | | | | Path Optimization Design Document | | | | | | |  | | |  |  | | | | Status: | Draft | | | | Version: | 0.0 | | | | Date: | **15 Nov 2018** | | | | | |
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# Document Purpose

This document is used for providing the detailed Design of Path Optimization. It will provide the solution to find the shortest possible route that for visiting all the cities and return back to the initial city from where he started the journey, for a given set cities and the distance between them. We are using The Held Karp algorithm for this purpose. Solution is designed to work as follows:

* Dynamic programming which gives real time solution for any valid input entered by the user.
* Most optimal solution using the Held Karp algorithm

# Scope & Out of Scope

# Scope

* The scope of this design document is to implement a Path Optimization solution to find the shortest possible route that visits each city and return to the initial city from where he started the journey.
* Docker Containerization of the solution

# Out of Scope

The activities/deliverables which are out of scope of this change are:

* It cannot provide the solution for directed graphs (path to be ravelled among the cities is not defined.)

**Road Map for Path Optimization Solution**

* The initial product will contain the following components.
  + - Optimized path for given cities.

• Planning to extend this by integrating google map services. Real time view of optimal distance between cities can be plot with a good visual effect.

# Requirement Reference

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| --- | --- |
| **Requirements** | |
| US001 | User will provide a number of cities and distance between each city. Application should give Shortest path. |
| US002 | User should be able to containerize the solution and run the solution in docker |
| **Version Control through Bitbucket** | |
| US003 | User can download the product from gitHub public repository. |

# Assumptions and Dependencies



# Assumptions

* + - The initial solution cannot ensure additional requirements like finding optimal path for cities connected in particular design patterns. Shortest path can be calculated considering distance between cities in any direction.
    - Public GitHub repository can be used for version control
    - Docker container setup will be used from available public sources under trail run

# Dependencies

* Availability of public gitHub repositories for version control
* Availability of Docker setup

# Solution Architecture

* Centralized Source Control system to be followed (GitHub in this case).
* Maven based java project .
* Dynamic programming for various inputs to be considered



# Technology Stack

1. Java Maven Project
2. Dockers

# References

Need to be added